

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of : Before the Board of Appeals  
Yasuyuki TANAKA et al. : Appeal No.:  
Serial No.: 08/941,132 : Group No.: 1713  
Filed: September 30, 1997 : Examiner: ZITOMER, F.  
For: MODIFIED NATURAL RUBBER



September 7, 2000  
Docket No.: 0649-0619P

APPEAL BRIEF

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APPEAL BRIEF

Honorable Commissioner of  
Patents and Trademarks  
Washington, D.C. 20231

September 7, 2000  
Docket No.: 0649-0619P

Sir:

This Appeal Brief is respectfully submitted on behalf of the Appellants in connection with the above-identified application.

This is an appeal from the Examiner's Final Office Action dated December 7, 1999 finally rejecting claims in connection with the present application, the due date for filing the Appeal Brief having been extended one month to September 7, 2000. The appealed claims are presented in the attached Appendix.

REAL PARTY IN INTEREST

In accordance with 37 C.F.R. 1.192(c)(1), it is submitted that the real party in interest with respect to the present application constitutes the Assignees of the present application

KAO CORPORATION and SUMITOMO RUBBER INDUSTRIES, LTD., all of Japan.

**RELATED APPEALS AND INTERFERENCES**

In accordance with 37 C.F.R. 1.192(c)(2), it is submitted there are no other appeals or interferences known to the appellants, the undersigned, or the Assignees which will directly affect or be directly affected by or have a bearing on the Board's decision in the present appeal.

**STATUS OF THE CLAIMS ON APPEAL**

Claims 9-19 are appealed from the Examiner's Final Office Action dated December 7, 1999, finally rejecting these claims. It is noted that non-elected claims 1-3, 7 and 8 are also pending in the present application.

**STATUS OF AMENDMENTS**

No amendments were submitted after the Final Office Action and all other amendments submitted during the prosecution of the present application have been entered and fully considered by the Examiner.

SUMMARY OF THE INVENTION

The present invention is directed to: 1.) a novel process for the production of a graft-copolymerized natural rubber which comprises a step of deproteinizing natural rubber followed by graft-copolymerizing the deproteinized natural rubber; and 2.) a novel process for the production of an epoxidized natural rubber which comprises a first step of deproteinizing natural rubber and then epoxidizing the deproteinized natural rubber.

REFERENCES RELIED UPON IN THE FINAL REJECTION

The final Office Action dated December 7, 1999, relies on the following references for the three pending rejections:

Rejection (1) - Yasuyuki et al. EP 0 584 597 and

Kondo et al. U.S. Patent No. 4,208,490;

Rejection (2) - Yasuyuki et al. EP 0 584 597 and Burlett et al., U.S. Patent No. 5,118,546; and

Rejection (3) - Yasuyuki et al. EP 0 584 597 and Hayashi et al. U.S. Patent No. 4,528,340.

ISSUES ON APPEAL

Whether claims 9-19 should stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Yasuyuki et al. and Kondo et al.

Whether claims 9-19 should stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Yasuyuki et al. and Burlett et al.

Whether claims 9-19 should stand rejected under 35 U.S.C. § as being unpatentable over the combination of Yasuyuki et al. and Hayashi et al.

#### GROUPING OF CLAIMS

It is submitted that the presently appealed claims should be considered separately in at least the following two groups: 1.) Group I including claims 9, 11 and 13-16; and 2.) Group II including claims 10, 12 and 17-19. Note that Group I is drawn to a process comprising a step of graft-copolymerizing the deproteinized natural rubber and Group II is drawn to a process comprising a step of epoxidizing the deproteinized natural rubber. It is requested that Groups I and II be considered separately for reasons which will be more particularly set forth in Appellants' arguments below.

#### APPELLANTS ARGUMENTS

Below is a summary of the arguments indicated in the Final Office Action by the U.S. Examiner, followed by the arguments of Appellants in support of the patentability of the appealed claims.

SUMMARY OF EXAMINER'S ARGUMENTS

In support of the rejection of claims 9-19 under 35 USC §103, the Final Office Action of December 7, 1999 included the following arguments:

The claimed invention relates to grafting and epoxidizing natural rubber which has been deproteinized. All of the procedures are generally known and the present coupling is deemed obvious for the additive effect. More directly, Yasuyuki teaches deproteinizing natural rubber to nitrogen levels below 0.02% by weight to remove allergens and enhance physical properties [Table 1, Example 1, claim 2, page 2, line 52 - page 3, line 11]. "By almost completely eliminating non-rubber components, an advantageous material for producing rubber products which suffer from little energy loss and have excellent mechanical properties, improved crepe characteristics and improved aging resistance, can be provided." [page 3, lines 3-6]. The deproteinized rubber also possesses excellent processing and mechanical characteristics [page 24, lines 1-27]. Kondo teaches enhancing the physical properties and appearance of natural rubber by grafting with methylmethacrylate [column 2, line 61 - column 3, line 49; column 4, lines 24-28]. There is no limitation on the proportion of rubber to grafted monomer, however, a 3-60% range if rubber content by weight is preferred [column 3, line 30-34] which appears to fall within the present graft ratio range of 26.5-36.7. It is generally known in the art to epoxidize rubber to enhance properties such as hydrophilicity. Hayashi e.g. teaches epoxidizing rubber in the range of 5-60% [column 3, lines 3-25] while Burlett teaches epoxidizing rubber in the range of 15-85% [column 2, lines 5-17]. Kondo or Hayashi or Burlett differs from the claimed invention by not disclosing deproteinized rubber.

It would have been obvious to deproteinize rubber before grafting and/or epoxidation in the expectation of reducing allergens and enhancing the physical and mechanical properties thereof because Yasuyuki teaches that deproteinizing affords reductions in allergens and enhancements on physical and mechanical properties for the same class of rubbers used by Kondo or Hayashi or Burlett.

Applicant's arguments filed October 14, 1999 have been fully considered but they are not persuasive. The gist of said argument is that the Miyamoto declaration shows that deproteinization has solved a problem associated with either grafting or epoxidizing rubber. However, as stated in prior Office actions even if unexpected results have been obtained the argument is not compelling because obviousness does not require a showing of different motivation. See e.g. *Ex parte Obiaya*, 227 USPQ 58,60; *In re Nolan*, 193 USPQ 641 (CCPA 1977); and *In re Dillon*, 16 USPQ2d, 1897 (CAFC 1990). In this regard it is well settled "...that when a claim recites using an old composition or structure and the use is directed to a result or property of that composition or structure, then the claim is anticipated." *In re May*, 197 USPQ 601, (CCPA 1978); MPEP 2112.02.

#### APPELLANTS ARGUMENTS SUPPORTING PATENTABILITY

In response to the above-reasons indicated for the rejections under 35 U.S.C. § 103 in the Final Office Action, the following arguments are respectfully submitted in support of the patentability of the appealed claims.

#### Present Invention and Its Advantages

The present invention is directed to a novel process which comprises a step of deproteinizing natural rubber followed by a step of either epoxidizing the deproteinized natural rubber or graft copolymerizing the deproteinized natural rubber. The use of the deproteinized natural rubber has distinct advantages over natural rubber which contains proteins.

First, the amount of protein occurring in natural rubber differs depending on the particular strain and location of the



rubber tree. Therefore, deproteinizing the natural rubber gives an intermediate composition which is essentially identical from batch to batch no matter the source. This allows for greater control of the steps for modifying the rubber.

Second, the present inventors have unexpectedly found that the proteins which naturally occur in rubber, have a deleterious effect on the chemical processes of graft copolymerizing the rubber and epoxidizing the rubber. By removing the naturally occurring proteins from the rubber, the graft ratio and graft efficiency increases and the epoxidation ratio also increase.

Third, products prepared with protein-containing rubber can elicit an allergic reaction in the person using the products. These products include surgical gloves, various catheters and anesthetic masks. By removing these naturally occurring proteins, the final products produced therefrom would have a reduced likelihood of causing such an allergic reaction.

#### Distinctions between the Presently Claimed Invention of Claims

##### 9-19 and Yasuyuki et al.

Yasuyuki et al. teach a process for removing proteins from natural rubber. The advantages of the deproteinizing natural rubber include: i) elevating the green strength, ii) preventing allergic reactions, iii) lowers water absorptivity of the rubber, iv) improved crepe characteristics, vii) improved aging

resistance, and viii) stabilizes the vulcanizing characteristics. (See the first paragraph of page 3).

Yasuyuki et al. fail to teach or suggest further chemically modifying the deproteinized rubber by grafting at a high efficiency or epoxidizing at a high epoxidation ratio. In addition, there is no teaching or suggestion by Yasuyuki et al. that proteins found in natural rubber will adversely affect the grafting or epoxidation of the natural rubber. Thus, significant patentable distinctions exist between the present invention and Yasuyuki et al.

**Distinctions Between the Presently Claimed Invention and Yasuyuki et al. and Kondo et al.**

The Examiner, aware of the deficiencies of Yasuyuki et al. cites Kondo et al. in order to cure those deficiencies. Appellants respectfully submit that Kondo et al. does not cure the deficiencies of Yasuyuki et al.

Kondo et al. teach "a process for preparing polymer resins by polymerization of at least one ethylenic monomer onto at least one rubbery polymer optionally grafted with at least one ethylenic monomer..." see lines 20-23 of column 2. "For polymerization of the monomer component onto the rubber component, there may be employed conventional polymerization initiators and chain transfer agents." See lines 35-38 of column 3.

Regarding present claims 10, 12 and 17-19, Appellants respectfully submit that neither Yasuyuki et al. nor Kondo et al. teach an epoxidation reaction of any substrate. M.P.E.P. 2143.03 (revised February 1, 2000) instructs that to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. Thus, significant patentable distinctions exist between the present invention as defined in claims 10, 12 and 17-19 and Yasuyuki et al. and Kondo et al.

Regarding present claims 9, 11 and 13-16, Appellants respectfully submit that Kondo et al. fail to teach or suggest: 1) the graft copolymerization of a deproteinized rubber; and 2) the improvements derived from using deproteinized rubber as the substrate.

The superior graft efficiency of the deproteinized rubber can be seen from the data in the following Table.

TABLE I<sup>a</sup>

|                          | N Content <sup>b</sup><br>(%) | Graft Ratio<br>(%) | Graft<br>Efficiency<br>(%) |
|--------------------------|-------------------------------|--------------------|----------------------------|
| Example 1                | 0.008                         | 33.4               | 66.2                       |
| Example 2                | 0.05                          | 32.5               | 65.4                       |
| Example 3                | 0.10                          | 26.5               | 62.7                       |
| Comparative<br>Example 1 | 0.16                          | 22.4               | 59.1                       |
| Comparative<br>Example 2 | 0.34                          | 21.2               | 59.4                       |

a: This table can be found on page 20 of the present specification.

b: The N Content is proportional to the amount of protein contained in the rubber.

As can be seen from Table I, the graft ratio and graft efficiency improve as the protein content decreases. This result cannot be expected based upon the teachings of Yasuyuki et al. as Mr. Yoshiaki MIYAMOTO avers in the Declaration under 37 C.F.R. § 1.132 (hereinafter "MIYAMOTO Declaration") which is attached hereto (this Declaration was originally made of record as an attachment to the May 11, 2000 Amendment).

Mr. MIYAMOTO is of the opinion that the skilled artisan would not reasonably conclude that the resulting efficiency of the grafting would differ when using natural rubber versus deproteinized rubber.

Through logic, the skilled artisan would reasonably conclude that there would be little to no difference in the efficiency of the grafting process when using natural rubber versus

deproteinized rubber, since the naturally occurring proteins are not extracted from the rubber, *per se*, and are simply broken down to smaller units called polypeptides.

Yasuyuki et al. teach that the deproteinized rubber still contains the polypeptides formed during the deproteinization step (see line 34 of page 4 to line 9 of page 5). Therefore, the skilled artisan would reasonably conclude that there would be little or no improvement in the efficiency of the graft copolymerization reaction using the deproteinized rubbers, since the polypeptides from the naturally occurring proteins are still present and would impede the graft copolymerization reaction in the same manner as would the naturally occurring proteins.

In Mr. MIYAMOTO's opinion, the improved efficiency of the graft copolymerization reactions using the deproteinized rubbers is unexpectedly superior to the graft-copolymerization using natural rubber, since: 1) the polypeptides of the naturally occurring proteins are still present in the deproteinized rubber of Yasuyuki et al.; and 2) the combination of Yasuyuki et al. and Kondo et al., fail to teach or suggest that there would be such an improved efficiency.

Thus, significant patentable distinctions exist between the present invention and the combination of Yasuyuki et al. and Kondo et al.

Distinctions Between the Presently Claimed Invention and  
Yasuyuki et al. and Burlett et al.

The Examiner, aware of the deficiencies of Yasuyuki et al. cites Burlett et al. in order to cure those deficiencies. Appellants respectfully submit that Burlett et al. does not cure the efficiencies of Yasuyuki et al.

Burlett et al. teach

"an elastomeric composition comprising a blend of from about 25 to about 75 percent by weight of polychloroprene and from about 75 to about 25 percent by weight of epoxidized natural rubber having a level of epoxide modification in the range of from about 15 to 85 mole percent." See the Abstract.

Regarding present claims 9, 11 and 13-16, Appellants respectfully submit that neither Yasuyuki et al. nor Burlett et al. teach the graft copolymerization reaction of any substrate. M.P.E.P. 2143.03 (revised February 1, 2000) instructs that to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. Thus, significant patentable distinctions exist between the present invention as defined in claims 9, 11 and 13-16 and Yasuyuki et al. and Burlett et al.

Regarding present claims 10, 12 and 17-19, Appellants respectfully submit that Burlett et al. fail to teach or suggest:

- 1) the epoxidation of a deproteinized rubber; and
- 2) the

improvements derived from using deproteinized rubber as the substrate.

The superior epoxidation efficiency of the deproteinized rubber can be seen from the data in the following Table.

TABLE II<sup>a</sup>

|              | N<br>Content <sup>b</sup><br>(%) | Peracid        | Epoxidation<br>Ratio<br>(%) | Gel<br>Content in<br>Toluene | Plasti-<br>city |
|--------------|----------------------------------|----------------|-----------------------------|------------------------------|-----------------|
| Ex 4         | 0.008                            | performic acid | 30.2                        | 8                            | 42.1            |
| Ex 5         | 0.008                            | peracetic acid | 29.5                        | 10                           | 47.5            |
| Ex 6         | 0.10                             | performic acid | 26.0                        | 20                           | 58.9            |
| Comp<br>Ex 3 | 0.16                             | performic acid | 24.3                        | 40                           | 70.2            |
| Comp<br>Ex 4 | 0.34                             | performic acid | 24.2                        | 42                           | 71.3            |

a: This table can be found on page 22 of the present specification.

b: The N Content is proportional to the amount of protein contained in the rubber.

As can be seen from Table II, the epoxidation ratio, gel content, and plasticity improve as the protein content decreases. This result cannot be expected based upon the teachings of Yasuyuki et al. as Mr. Yoshiaki MIYAMOTO avers in the MIYAMOTO Declaration.

Mr. MIYAMOTO is of the opinion that the skilled artisan would not reasonably conclude that the resulting efficiency of epoxidation reaction would differ when using natural rubber versus deproteinized rubber.

Through logic, the skilled artisan would reasonably conclude that there would be little to no difference in the efficiency of the epoxidation processes when using natural rubber versus deproteinized rubber, since the naturally occurring proteins are not extracted from the rubber, *per se*, and are simply broken down to smaller units called polypeptides.

As mentioned above, Yasuyuki et al. teach that the deproteinized rubber still contains the polypeptides formed during the deproteinization step (see line 34 of page 4 to line 9 of page 5). Therefore, the skilled artisan would reasonably conclude that there would be little or no improvement in the efficiency of the epoxidation reaction using the deproteinized rubbers, since the polypeptides from the naturally occurring proteins are still present and would impede the epoxidation reaction in the same manner as would the naturally occurring proteins.

In Mr. MIYAMOTO's opinion, the improved efficiency of the epoxidation reaction using the deproteinized rubbers is unexpectedly superior to the epoxidation reaction using natural rubber, since: 1) the polypeptides of the naturally occurring proteins are still present in the deproteinized rubber of Yasuyuki et al.; and 2) the combination of Yasuyuki et al. and Burlett et al., fail to teach or suggest that there would be such an improved efficiency.



Thus, significant patentable distinctions exist between the present invention and the combination of Yasuyuki et al. and Burlett et al.

Distinctions Between the Presently Claimed Invention and  
Yasuyuki et al. and Hayashi et al.

The Examiner, aware of the deficiencies of Yasuyuki et al. cites Hayashi et al. in order to cure those deficiencies. Appellants respectfully submit that Hayashi et al. does not cure the deficiencies of Yasuyuki et al.

Hayashi et al. teach

"epoxidizing a diene polymer material consisting of at least one member selected from rubber polymers which have a molecular weight of 10,000 or more and contain an 85 molar % of more 1,4-addition structure based on the entire molar amount to double bonds contained therein, and crystalline 1,2-polybutadiene polymers... and contain a 75 molar % or more 1,2-addition structure based on the entire molar amount of double bonds contained therein, for example, with a combination of a carboxylic acid and a peroxide compound, or a carboxylic peracid..." See the Abstract.

Regarding present claims 9, 11 and 13-16, Appellants respectfully submit that neither Yasuyuki et al. nor Hayashi et al. teach the graft copolymerization reaction of any substrate. M.P.E.P. 2143.03 (revised February 1, 2000) instructs that to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.

Thus, significant patentable distinctions exist between the present invention as defined in claims 9, 11 and 13-16 and Yasuyuki et al. and Hayashi et al.

Regarding present claims 10, 12 and 17-19, Appellants respectfully submit that Hayashi et al. fail to teach or suggest: 1) the epoxidation of a deproteinized rubber; and 2) the improvements derived from using deproteinized rubber as the substrate.

The superior epoxidation efficiency of the deproteinized rubber is not made obvious by the combination of Yasuyuki et al. and Hayashi et al. for reasons analogous to those described, *supra*, for the combination of Yasuyuki et al. and Burlett et al. which is incorporated herein by reference.

In short, Mr. MIYAMOTO holds the opinion that the improved efficiency of the epoxidation reaction using the deproteinized rubbers is unexpectedly superior to the epoxidation reaction using natural rubber, since: 1) the polypeptides of the naturally occurring proteins are still present in the deproteinized rubber of Yasuyuki et al.; and 2) the combination of Yasuyuki et al. and Hayashi et al., fail to teach or suggest that there would be such an improved efficiency.

Thus, significant patentable distinctions exist between the present invention and the combination of Yasuyuki et al. and Hayashi et al.

Appellant's Response to the Examiner's Arguments

On page 3 of the December 7, 1999 Final Office Action, the Examiner states,

It would have been obvious to deproteinize rubber before grafting and/or epoxidation in the expectation of reducing allergens and enhancing the physical and mechanical properties for the same class of rubbers used by Kondo or Hayashi or Burlett.

Appellants find the Examiner's position untenable for the following reasons.

With regard to the Examiner's allegation that the artisan would have the expectation of reducing allergens, Yasuyuki et al. teach that there would be a reduction in the allergens of the deproteinized natural rubber. There is no teaching or suggestion that allergens are a problem with epoxidized rubber and/or grafted rubber, and as such the skilled artisan would not be motivated to use the rubbers of Yasuyuki et al. based upon this teaching that the deproteinized natural rubbers have reduced allergens.

With regard to the Examiner's allegation that the artisan would be motivated to use the deproteinized rubbers of Yasuyuki et al. to enhance the physical and mechanical properties of the same class of rubbers used by Kondo or Hayashi or Burlett, Appellants respectfully submit that the artisan is well aware that the physical and mechanical properties of polymeric starting materials would be unequivocally altered during the epoxidation/grafting

processes. As such, the artisan would not have a reasonable expectation that the advantageous physical and mechanical properties of the deproteinized rubber starting materials, would automatically be engendered in the epoxidized rubber and/or grafted rubber.

The Examiner alleges that the unexpected results do not outweigh the expected results, see paragraph 3 of page 3 of the December 7, 1999 Final Office Action. Appellants respectfully submit that the MIYAMOTO Declaration renders the Examiner's allegation moot.

Mr. MIYAMOTO holds the opinion that the improved efficiency of the epoxidation reaction and the graft copolymerization reaction are unexpectedly superior when using the deproteinized rubber versus natural rubber, since: 1) the polypeptides of the naturally occurring proteins are still present in the deproteinized rubber of Yasuyuki et al.; and 2) the combination of Yasuyuki et al. and Hayashi et al., Kondo et al., or Burlett et al., fail to teach or suggest that there would be such an improved efficiency.

Finally, the Examiner argues that

it is well settled "...that when a claim recites using an old composition or structure and the use is directed to a result or property of that composition or structure, then the claim is anticipated." In re May, 197 USPQ 601, (CCPA 1978); MPEP 2112.02.

In response, Appellants respectfully submit that present claims do not recite a use directed to a result or property of an old composition. The present claims are drawn to the discovery of a new use for an old structure based on unknown properties of the structure. As stated in MPEP 2112.02, such a discovery may be patentable as a process of use.

In conclusion, numerous and significant patentable distinctions exist between the present invention and the combination of Yasuyuki et al., with Kondo et al., Burlett et al., or Hayashi et al.

#### Conclusion

If any questions remain regarding the above matters, please contact Appellant's representative, Mr. John W. Bailey, in the Washington metropolitan area at the phone number listed below.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Appellant(s) respectfully petition(s) for a one (1) month extension of time for filing a reply in connection with the present application, and the required fee of \$110.00 is attached hereto.

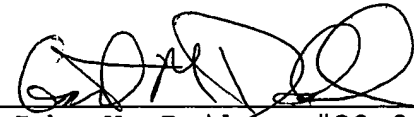
If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17;

particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By

  
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0649-0619P  
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Enclosures      Yoshiaki MIYAMOTO Declaration which was attached to  
Appellants' Amendment filed May 11, 2000

APPENDIX  
CLAIMS ON APPEAL



Claims 9-19 are appealed and are as follows:

Claim 9. A process for the production of a graft-copolymerized natural rubber which comprises deproteinizing natural rubber and then graft-copolymerizing the natural rubber.

Claim 10. A process for the production of an epoxidized natural rubber which comprises deproteinizing natural rubber and then epoxidizing the natural rubber.

Claim 11. The process according to claim 9, wherein the deproteinized natural rubber has a nitrogen content of less than 0.10 % by weight.

Claim 12. The process according to claim 10, wherein the deproteinized natural rubber has a nitrogen content of less than 0.10 % by weight.

Claim 13. The process according to claim 9, wherein the deproteinized natural rubber is graft copolymerized with an organic compound having an unsaturated bond selected from the

group consisting of methacrylic acid, acrylic acid, methyl methacrylate, methyl acrylate, 2-hydroxyethylmethacrylate, acrylonitrile, vinyl acetate, styrene, acrylamide and vinylpyrrolidone.

Claim 14. The process according to claim 9 wherein the graft copolymerization step has a graft efficiency of 62.7% or more.

Claim 15. The process according to claim 9, wherein the deproteinized natural rubber has a nitrogen content of less than 0.05 % by weight.

Claim 16. The process according to claim 9, wherein the deproteinized natural rubber has a nitrogen content of less than 0.02 % by weight.

Claim 17. The process according to claim 10, wherein the epoxidation step has an epoxidation rate which is sufficient to produce an epoxidized deproteinized natural rubber having an epoxidation ratio of 26.0% or more in 5 hours.

Claim 18. The process according to claim 10, wherein the deproteinized natural rubber has a nitrogen content of less than 0.05 % by weight.



Claim 19. The process according to claim 10, wherein the deproteinized natural rubber has a nitrogen content of less than 0.02 % by weight.